



The project is funded by the European Maritime and Fisheries Fund and The Danish Fisheries Agency



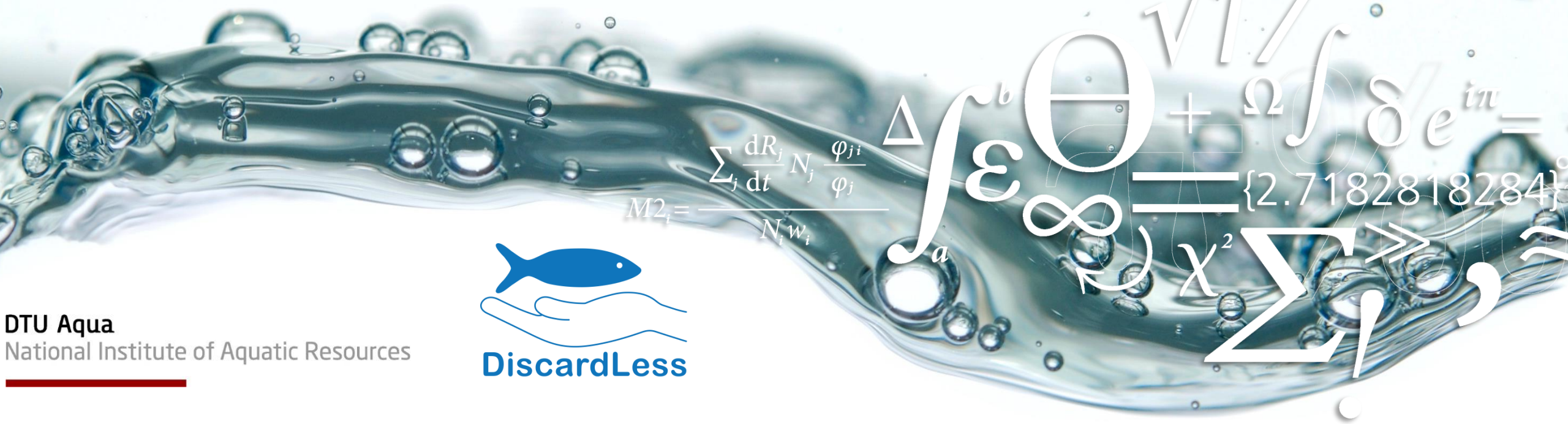
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# CAM-pliance: Keeping an eye on discards with Electronic Monitoring

Kristian S. Plet-Hansen

A. van Helmond, L. Kindt-Larsen, J. Dalskov, M. Dueholm, C. Ulrich



$$M2_i = \frac{\sum_j \frac{dR_j}{dt} N_j \frac{\varphi_{ji}}{\varphi_j}}{N_i w_i}$$

$$\int_a^b \epsilon \Theta + \Omega \int \delta e^{i\pi} = \{2.7182818284\}$$

$$\sqrt{17}$$

$$\chi^2$$

$$\Sigma$$

$$\gg$$

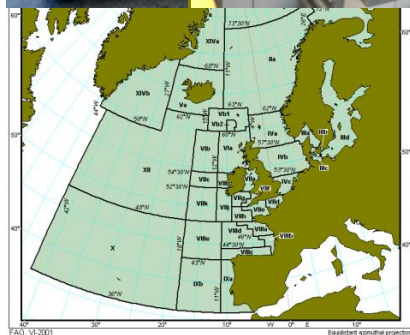
$$\approx$$



# What is meant by Fully Documented Fisheries?

Independent documentation of fishing activities either with observers or with electronic monitoring (EM) by means of cameras and sensors.

## Area and gear



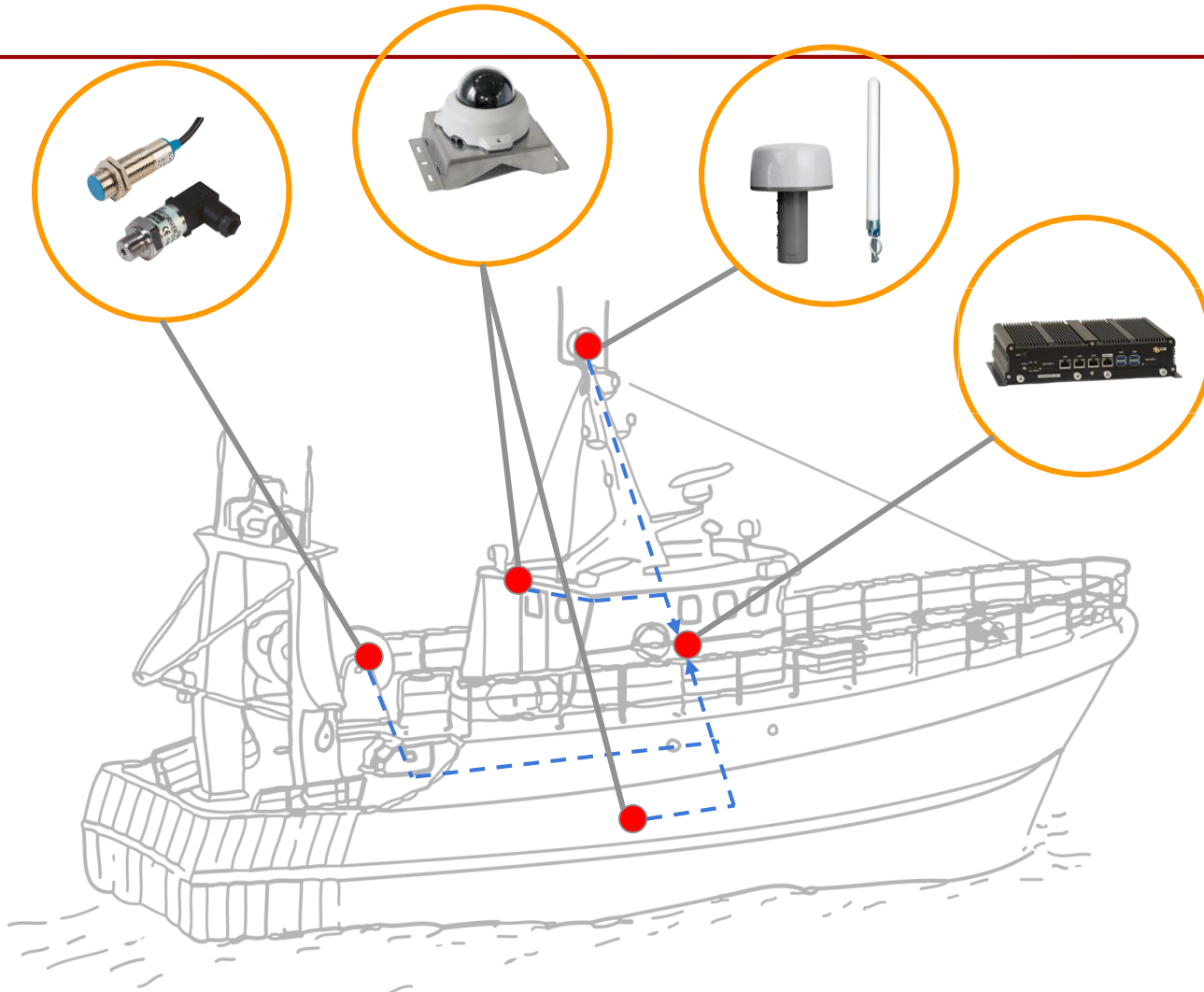
## Catches (including unwanted)



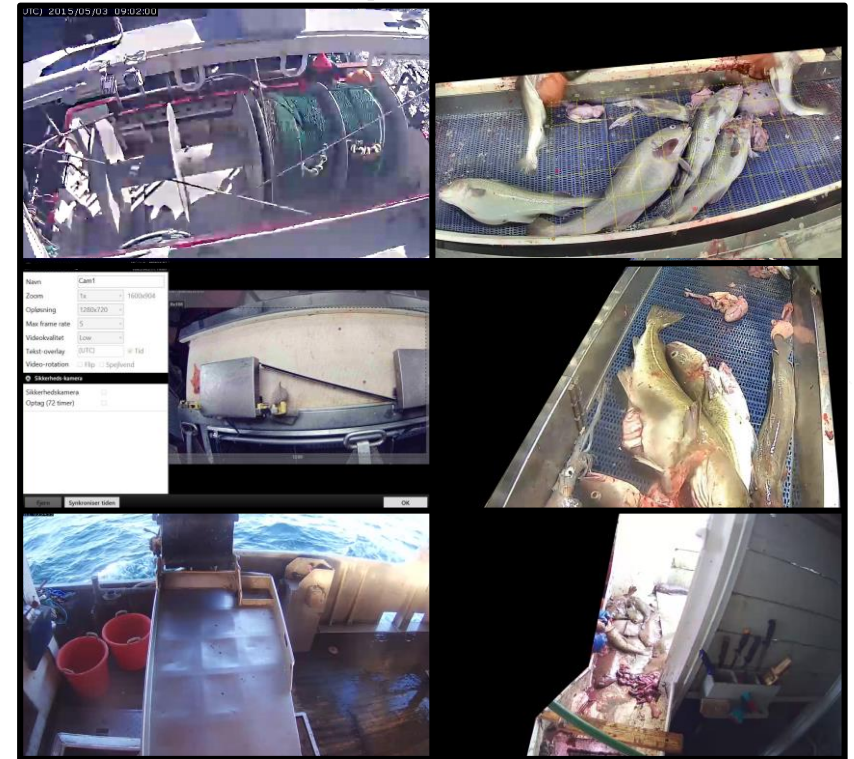
## Verification of informations







3) What do you catch?  
4) What are the discards?



# Brief overview

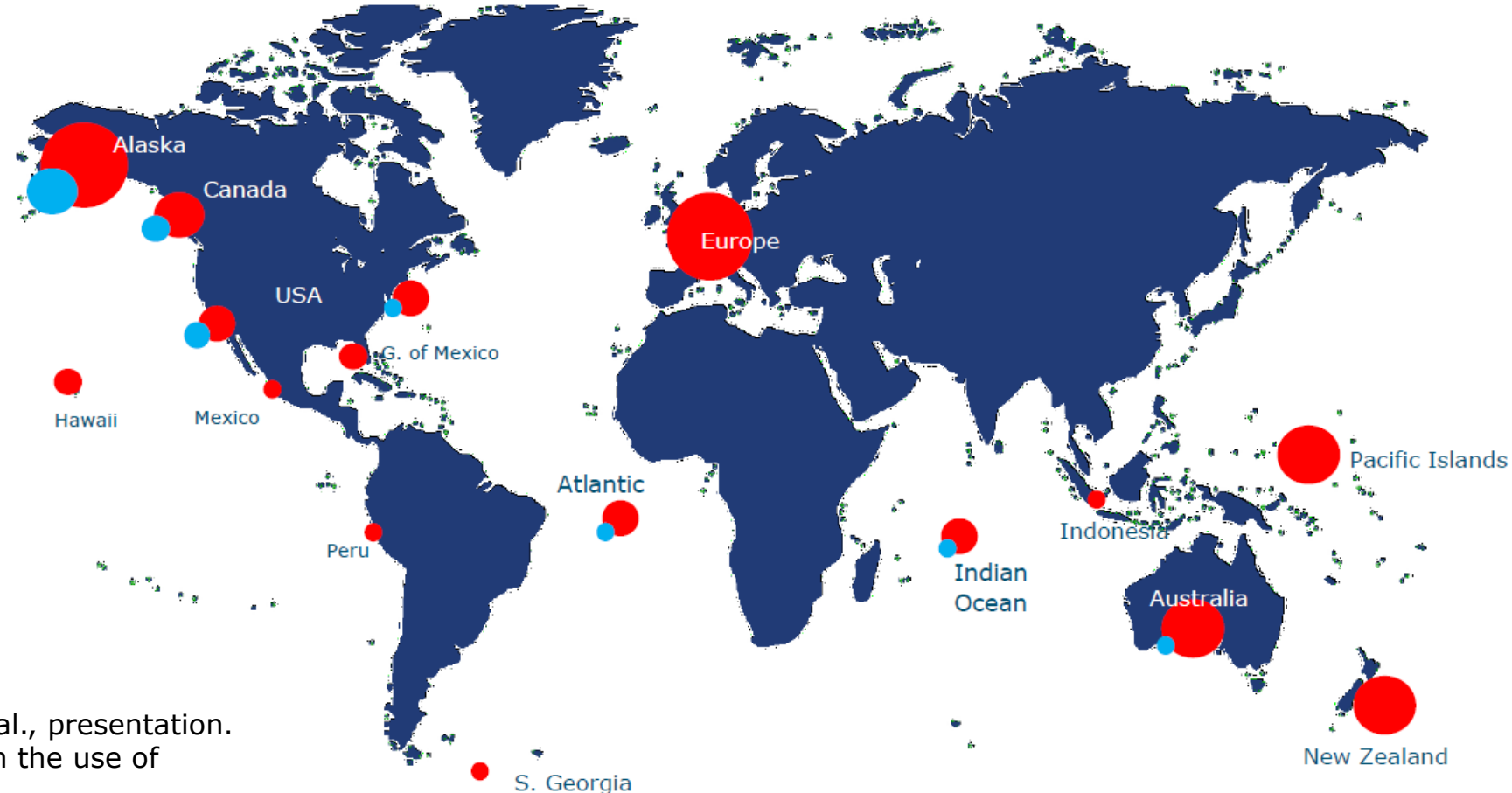
## EM projects worldwide (1999-2018)

● = pilot studies  
● = full programmes

🐟 First trials:  
Canada, 1999

🐟 Worldwide:  
Vessels from 9 to >100  
meters in length and  
different gear types

🐟 Trials in several EU  
member states

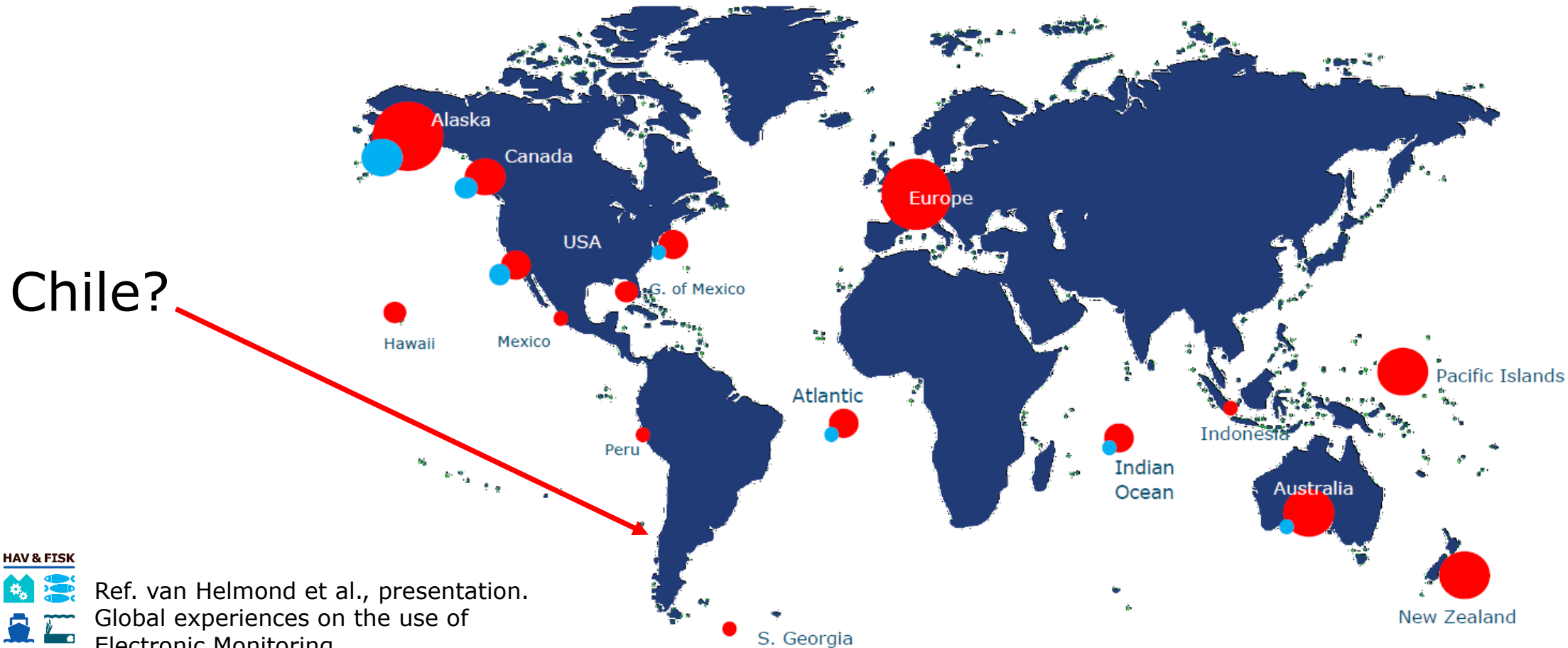


Ref. van Helmond et al., presentation.  
Global experiences on the use of  
Electronic Monitoring

# Brief overview

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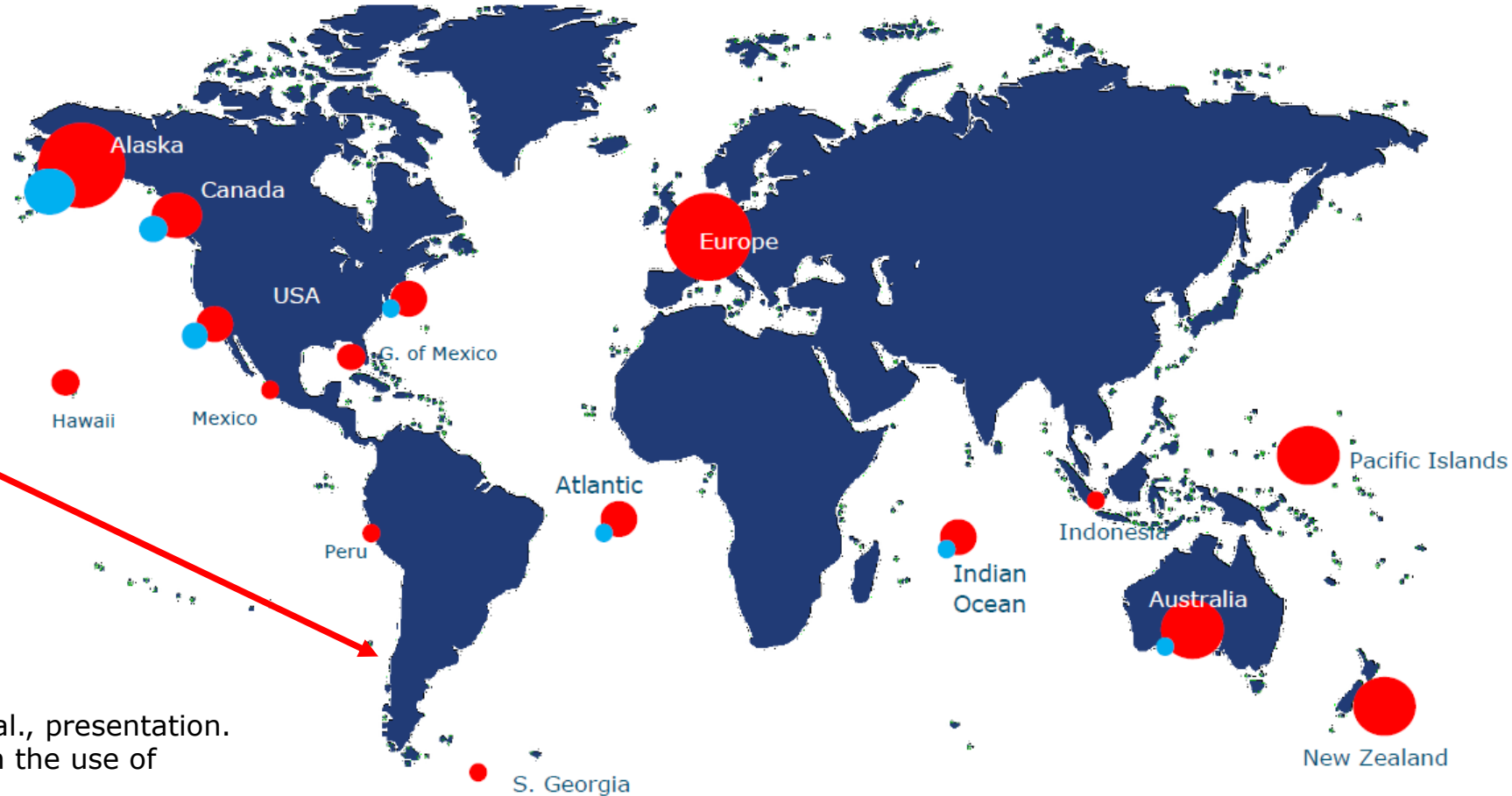
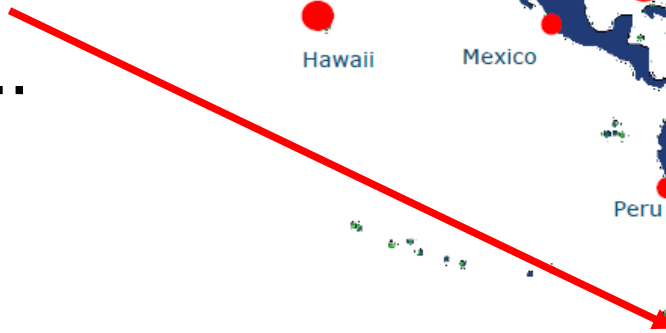
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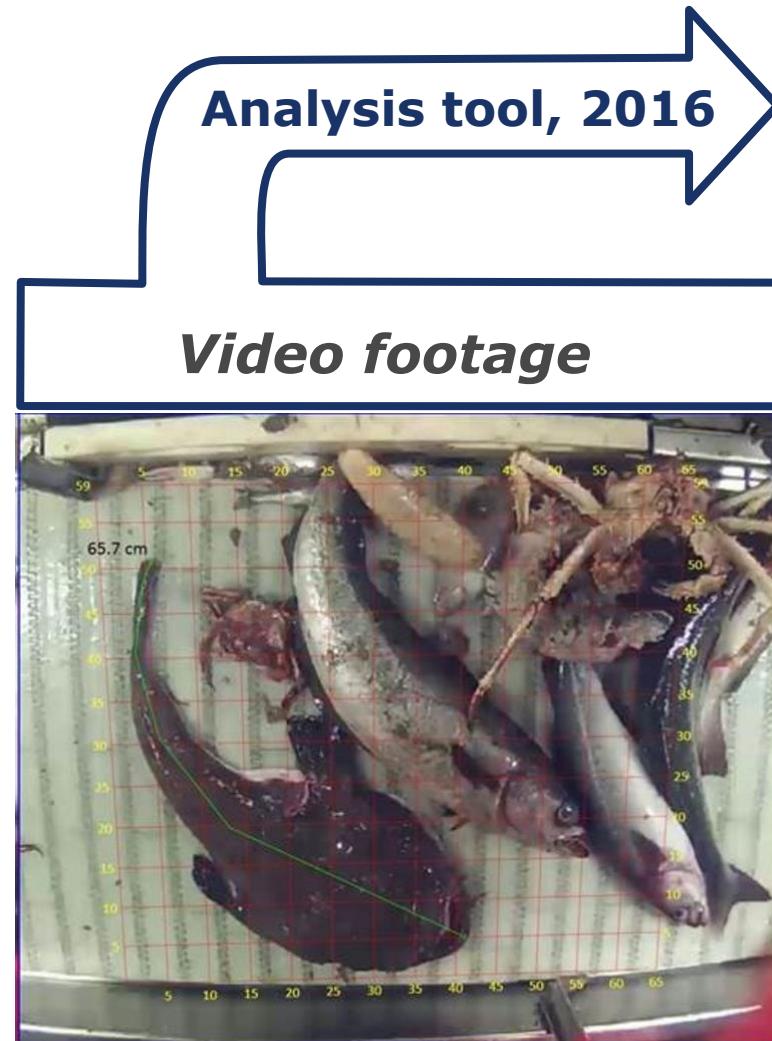
Wait for it...



Ref. van Helmond et al., presentation.  
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# Review process

- Reduced human review
  - Review a portion (e.g., 10%) of trips, hauls, catch
- Computer-assisted human review
  - Review fishing events only
  - ID species with human audit
- Computer review
  - ID species
  - Collect length/weight
  - Monitor compliance



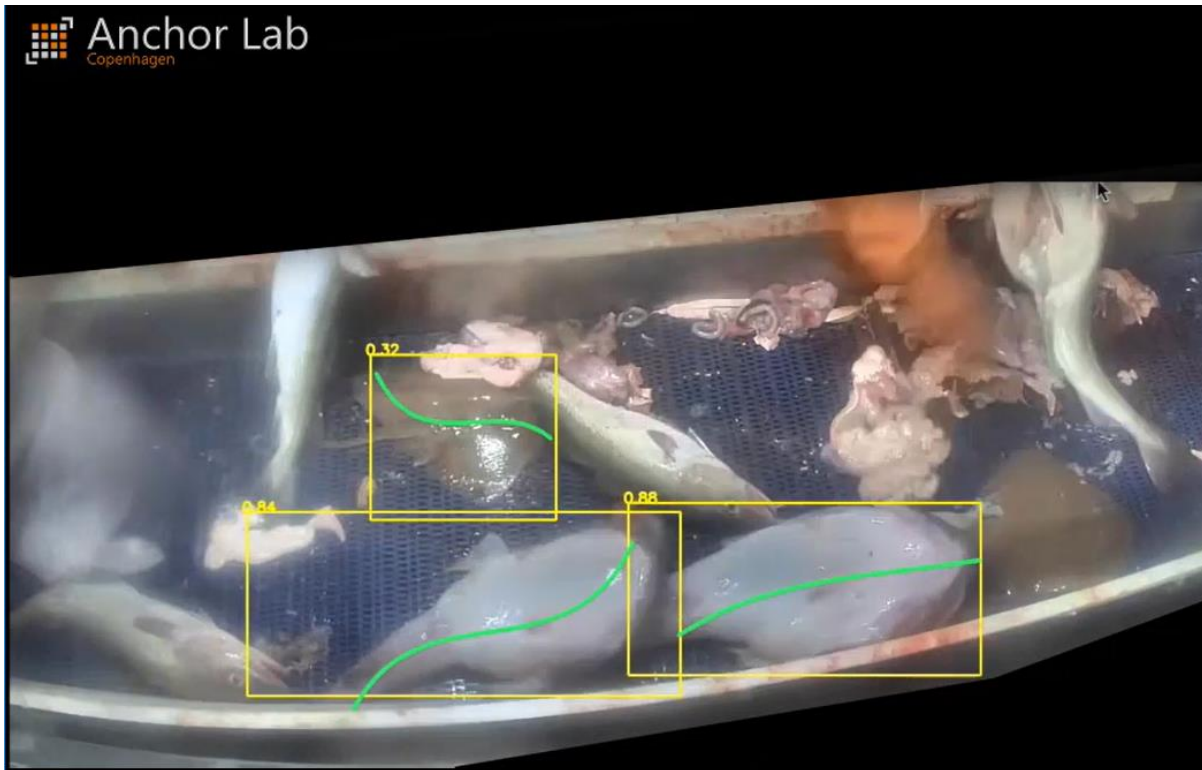
## Data

- Discard time
- Length measurement
- Weight estimate
- Haul, start/stop
- ID link to eLog
- Picture of every discard





# Automated Image Analysis and Review



- Estimation of real-time catches
- Automatic filling of logbooks
- Automatic declaration of protected species

Automatic recognition of monkfish







# Cost estimate / example



- Danish pilot: 12 vessels
- 5 roundfish species audited
- Average of ~30% of the fishing operations audited.
- Average of 21-35 minutes to analyze an operation



Logo: Rini Dimon

Ref. Bergsson et al. (2017), DOI: 10.13140/RG.2.2.23628.00645

- ~400 vessels, 10% haul coverage
- Estimate 1,200 TB (1,200,000 GB) data collected annually
- EM system + installation: ~8200 € per vessel

● "One time" cost estimate: 3.3 Mill. €

≈ 8300 €/vessel

● Running cost estimate : 1.9 Mill. €/year

≈ 4800 €/year/vessel

Ref. Plet-Hansen et al. in review



# In short

## Negative

- ✓ Cost of full scale
- ✓ Surveillance level  
(Big brother is watching)
- ✓ Species recognition  
(for some species)
- ✓ System breakdowns
- ✓ Misuse of data

## Positive

- ✓ Has been used in a variety of  
fleets and fisheries
- ✓ Possibility for level playing field
- ✓ Possibility to easy technical  
regulations
- ✓ Better data for stock assessment
- ✓ Verification of compliance with the  
landing obligation



Thank you for your attention

